BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2624
Hassan Mostafavi	Examiner: Allison, Andrae S.
Serial No.: 10/656,478	Confirmation No.: 8695
Filed: September 5, 2003	
For: SYSTEMS AND METHODS FOR TRACKING MOVING TARGETS AND MONITORING OBJECT POSITIONS	

APPEAL BRIEF UNDER 37 CFR § 41.37

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Commissioner for Patents
P.O. Box 1450
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Appellant submits this Appeal Brief pursuant to the Notice of Appeal filed January 5, 2011, and the pre-appeal brief conference decision mailed on February 24, 2011.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee Varian Medical Systems, Inc. of Palo Alto, California.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-66 are pending. Claims 1-66 are rejected, and are appealed. Claims 1, 22, 31, 40, 50, 53, and 63 are independent claims.

IV. STATUS OF AMENDMENTS

All amendments to the claims have been entered. A Response After Final under 37 C.F.R. § 1.116 was filed on October 5, 2010, in which no claims were amended.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present section of the Appeal Brief is included to comply with the requirements of 37 C.F.R. § 41.37(c)(v), and is not intended to limit the pending claims in any way.

Claim 1 recites:

1. A method of determining a position of a target region in a medical procedure, comprising:

acquiring an input image of a target region;

enhancing a feature of the input image based at least in part on a motion of a moving object, wherein the act of enhancing is performed such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving object moves relative to the stationary object, and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction;

registering the input image with a template; and

determining a position of the target region in the input image based on the registering;

wherein one of the acts of acquiring, enhancing, registering, and determining in the method is performed at least partially using a processor.

Claim 22 recites:

22. A system for determining a position of a target region in a medical procedure, comprising:

means for acquiring an input image of a target region;

means for enhancing a feature in the input image based at least in part on a motion of a moving object, wherein the means for enhancing performs the act of enhancing such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving object moves relative to the relatively stationary object, and wherein the means for enhancing is configured to accomplish the act of enhancing at least in part by performing image averaging and image subtraction;

means for registering the input image with a template; and

means for determining a position of the target region in the input image based on the registering.

Claim 31 recites:

31. A computer readable medium having a set of stored instructions, the execution of which causes a process to be performed, the computer readable medium being tangible and non-transitory, the process comprising:

acquiring an input image of a target region;

enhancing a moving feature in the input image based at least in part on a motion of a moving object, wherein the act of enhancing is performed such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving object moves relative to the relatively stationary object, and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction;

registering the input image with a template; and

determining a position of the target region in the input image based on the registering.

Claim 40 recites:

40. A method of monitoring a position of an object, comprising:

providing a reference image of the object;

acquiring a first image of the object;

determining a first composite image based on the reference image and the first image by performing a subtraction function; and

determining whether the object has moved based at least on the first composite image, wherein the act of determining whether the object has moved comprises using a contrast associated with the first composite image.

Claim 50 recites:

50. A system for monitoring a position of an object, comprising:

means for providing a reference image of the object;

means for acquiring a first image of the object;

means for determining a first composite image based on the reference image and the first image by performing a subtraction function; and

means for determining whether the object has moved based at least on the first composite image, wherein the means for determining whether the object has moved determines whether the object has moved using a contrast associated with the first composite image.

Claim 53 recites:

53. A computer readable medium having a set of stored instructions, the execution of which causes a process to be determined, the computer readable medium being tangible and non-transitory, the process comprising:

providing a reference image of the object;

acquiring a first image of the object;

determining a first composite image based on the reference image and the first image by performing a subtraction function; and

determining whether the object has moved based at least on the first composite image, wherein the act of determining whether the object has moved comprises using a contrast associated with the first composite image.

Claim 63 recites:

63. A method of determining a position of a target region in a medical procedure, comprising:

acquiring an input image of a target region;

enhancing a feature of the input image, wherein the act of enhancing is performed such that an object appears more noticeable than a stationary object if the object moves relative to the stationary object, and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction;

registering the input image with a template; and

determining a position of the target region in the input image based on the registering.

Embodiments of the claimed subject matter are described in at least figures 1, 2, 12, and their corresponding passages.

In particular, with respect to independent claim 1, at least the following passages in the subject specification describe examples of a method of determining a position of a target region in a medical procedure that includes: acquiring an input image of a target region (figure 2, element 204; paragraph 28); enhancing a feature of the input image based at least in part on a motion of a moving object, wherein the act of enhancing is performed such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving object moves relative to the stationary object (figure 2, element 206; paragraphs 29-32, 40), and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction (paragraph 30); registering the input image with a template (figure 2, element 208; paragraphs 33-36); and determining a position of the target region in the input image based on the registering (figure 2, element 210; paragraph 37); wherein one of the acts of acquiring, enhancing, registering, and

determining in the method is performed at least partially using a processor (figure 1, element 14; figure 12 element 1204; paragraph 29).

With respect to claim 22, at least the following passages in the subject specification describe examples of a system for determining a position of a target region in a medical procedure that includes: means for acquiring an input image of a target region (figure 2, element 204; paragraph 28; figure 1, element 14; paragraph 29; figure 12; paragraphs 83-90); means for enhancing a feature in the input image based at least in part on a motion of a moving object, wherein the means for enhancing performs the act of enhancing such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving object moves relative to the relatively stationary object (figure 2, element 206; paragraphs 29-32, 40; figure 1, element 14; paragraph 29; figure 12; paragraphs 83-90), and wherein the means for enhancing is configured to accomplish the act of enhancing at least in part by performing image averaging and image subtraction (paragraph 30); means for registering the input image with a template (figure 2, element 208; paragraphs 33-36; figure 1, element 14; paragraph 29; figure 12; paragraphs 83-90); and means for determining a position of the target region in the input image based on the registering (figure 2, element 210; paragraph 37; figure 1, element 14; paragraph 29; figure 12; paragraphs 83-90).

With respect to claim 31, at least the following passages in the subject specification describe examples of a computer readable medium that includes a set of stored instructions, the execution of which causes a process to be performed, the computer readable medium being tangible and non-transitory (paragraphs 85-88), the process comprising: acquiring an input image of a target region (figure 2, element 204; paragraph 28); enhancing a moving feature in the input image based at least in part on a motion of a moving object, wherein the act of enhancing is performed such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving

object moves relative to the relatively stationary object (figure 2, element 206; paragraphs 29-32, 40), and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction (paragraph 30); registering the input image with a template (figure 2, element 208; paragraphs 33-36); and determining a position of the target region in the input image based on the registering (figure 2, element 210; paragraph 37).

With respect to independent claim 40, at least the following passages in the subject specification describe examples of a method of monitoring a position of an object that includes: providing a reference image of the object (figure 11, element 1102; paragraph 75); acquiring a first image of the object (figure 11, element 1106; paragraph 77); determining a first composite image based on the reference image and the first image by performing a subtraction function (figure 11, element 1108; paragraph 78); and determining whether the object has moved based at least on the first composite image, wherein the act of determining whether the object has moved comprises using a contrast associated with the first composite image (figure 11, element 1110; paragraph 79).

With respect to independent claim 50, at least the following passages in the subject specification describe examples of a system for monitoring a position of an object that includes: means for providing a reference image of the object (figure 11, element 1102; paragraph 75; figure 1, element 14; paragraph 29; figure 12; paragraphs 83-90); means for acquiring a first image of the object (figure 11, element 1106; paragraph 77; figure 1, element 14; paragraph 29; figure 12; paragraphs 83-90); means for determining a first composite image based on the reference image and the first image by performing a subtraction function (figure 11, element 1108; paragraph 78; figure 1, element 14; paragraph 29; figure 12; paragraphs 83-90); and means for determining whether the object has moved based at least on the first composite image, wherein the means for determining whether the object has moved determines whether the object has moved using a contrast associated

with the first composite image (figure 11, element 1110; paragraph 79; figure 1, element 14; paragraph 29; figure 12; paragraphs 83-90).

With respect to independent claim 53, at least the following passages in the subject specification describe examples of a computer readable medium that includes a set of stored instructions, the execution of which causes a process to be determined, the computer readable medium being tangible and non-transitory (paragraphs 85-88), the process comprising: providing a reference image of the object (figure 11, element 1102; paragraph 75); acquiring a first image of the object (figure 11, element 1106; paragraph 77); determining a first composite image based on the reference image and the first image by performing a subtraction function (figure 11, element 1108; paragraph 78); and determining whether the object has moved based at least on the first composite image, wherein the act of determining whether the object has moved comprises using a contrast associated with the first composite image (figure 11, element 1110; paragraph 79).

With respect to independent claim 63, at least the following passages in the subject specification describe examples of method of determining a position of a target region in a medical procedure that includes: acquiring an input image of a target region (figure 2, element 204; paragraph 28); enhancing a feature of the input image, wherein the act of enhancing is performed such that an object appears more noticeable than a stationary object if the object moves relative to the stationary object (figure 2, element 206; paragraphs 29-32, 40), and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction (paragraph 30); registering the input image with a template (figure 2, element 208; paragraphs 33-36); and determining a position of the target region in the input image based on the registering (figure 2, element 210; paragraph 37).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection to be reviewed on appeal are as follows:

Claims 1-4, 6-9, 12-14, 18, 20, 23-27, 31-36, and 61-63 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. 2003/0086596 (Hipp) in view of U.S. Patent No. 5,535,289 (Ito).

Claims 40, 43, 46, 47-49, 50, 53, and 56 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,075,557 (Holliman) in view of Hipp.

Claims 64-66 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Holliman in view of Hipp, and further in view of U.S. Patent No. 5,134,472 (Abe).

Claims 25 and 26 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fenster in view of U.S. Patent No. 6,311,084 (Cormack).

Claim 5 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. Patent No. 6,563,945 (Holm).

Claim 10 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. 2004/0077952 (Rafter).

Claim 11 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. Patent No. 7,062,078 (Weese).

Claims 15-17, 19, 28-30, and 37-39 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. 2003/0026758 (Baker).

Claims 58-60 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. Patent No. 6,526,156 (Black).

Claims 41, 42, 44, 45, 51, 52, 54, and 55 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatantable over Holliman in view of Hipp, and further in view of U.S. Patent No. 5,109,435 (Lo).

VII. ARGUMENTS

I. Claim Rejections under 35 U.S.C. § 103 based on Hipp and Ito

Claims 1-4, 6-9, 12-14, 18, 20, 23-27, 31-36, and 61-63 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. 2003/0086596 (Hipp) in view of U.S. Patent No. 5,535,289 (Ito). Appellant herein addresses claim 22 as well since the claim 22 is discussed on page 6 of the Office Action.

Claim 1 recites that the act of enhancing is performed such that an image of the moving object is enhanced relative to an image of a relatively stationary object *if* the moving object moves relative to the stationary object (Emphasis Added). Claims 22, 31, and 63 recite similar limitations. According to page 5 of the Office Action, figure 4a of Hipp allegedly discloses the above limitations. Appellant respectfully disagrees.

Appellant notes that claims 1, 22, 31, and 63 describe that the act of enhancing is *conditioned upon* whether the object moves or not (note the limitation "if"). Appellant has thoroughly reviewed the entire disclosure of Hipp, and respectfully submits that there is nothing in figure 4a (nor in the rest) of Hipp that discloses or suggests enhancing an image *if* the object moves relative to a stationary object. Rather, figure 4a illustrates an example of radiographic image showing a search model region (see paragraph 41).

Furthermore, Hipp teaches identifying a specific vertebrae, and tracking such vertebrae in the images (see paragraph 102). Thus, in Hipp, once the vertebrae is identified, any image enhancement

that is performed is always for the specific vertebrae – regardless of whether it moves or not. Therefore, Hipp does not disclose, and in fact *teaches away* from, enhancing an image that is conditioned upon object movement.

According to the Office Action and the Advisory Action, Hipp discloses enhancing a moving object that moves relative to a stationary background. However, Appellant respectfully notes that such characterization of Hipp does not meet the above claimed limitations. This is because as discussed, Hipp teaches always enhancing a target object, regardless of whether it moves or not. Thus, just because the target object happens to moves relative to a background, it does not mean that the act of enhancing the target object is *conditioned upon* whether it moves or not. There is simply no disclosure in Hipp that any enhancing act is conditioned upon movement of an object.

Ito also does not disclose or suggest the above limitations, and is not being relied upon for the disclosure of the above limitations. Since none of the cited references discloses or suggests the above limitations, any purported combination of these references cannot result in the subject matter of claims 1, 22, 31, and 63. For at least the foregoing reasons, Appellant submits that the prima facie case of the § 103 rejection for claims 1, 22, 31, and 63 based on Hipp and Ito has not been established.

II. Claim Rejections under 35 U.S.C. § 103 based on Holliman and Hipp

Claims 40, 43, 46, 47-49, 50, 53, and 56 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,075,557 (Holliman) in view of Hipp.

Claim 40 recites that the act of determining whether the object has moved comprises using a contrast associated with the first *composite image* (which is obtained by performing a subtraction function) (Emphasis Added). Claims 50 and 53 recite similar limitations. According to page 17 of

the Office Action, element 49 in figure 12 of Holliman allegedly discloses a composite image. However, Appellant respectfully submits that element 49 of Holliman does not disclose or suggest any composite image. Rather, element 49 of Holliman actually discloses template matching between a template and an image area (see figure 12), and therefore, the element 49 does not disclose or suggest a composite image.

Also, contrary to the Examiner's characterization of element 49 that it discloses a composite image, Appellant respectfully notes that element 49 in figure 12 actually states "Template matching by finding *the position where there is a best correlation* between the template and the underlying image area" (Emphasis Added). Thus, the so-called template matching in Holliman actually involves determining a correlation between the template and an image area, and does not involve determining any *composite image*. Notably, the correlation determination results in a "correlation value" (see element 50 of figure 12), which is a number, and therefore, is clearly not a composite "image." In addition, "the position" in the above cited passage for element 49 clearly indicates that the matching is performed to determine a positional value, which is not a composite image.

Pages 4 and 17 of the Office Action also cites to column 11, lines 33-38 of Holliman for the disclosure of a "differential movement method," and states that such method "is used to create a composite image between the template and the input image." In the Advisory Action, the Examiner further emphasized that the template is an "image." However, even if the template is an image, Holliman teaches comparing such template "image" with an input image to determine a positional value. In particular, as discussed, Holliman discloses template matching that results in a single value, not a composite image. Thus, the differential movement method for the alleged template matching actually results in a value, not an image. This is evidenced by the description in Holliman, describing that the cross-correlation value at the best-matched position resulted from the template

matching "would be 1" (c14:20-21), which value is clearly not a composite image. Thus, Holliman clearly does not disclose or suggest the above limitations.

The method disclosed in Holliman, which is allegedly described by the Examiner as the differential movement method, is not for determining any image (much less, a composite image). This is further evidenced by the disclosure on column 11, lines 33-38 of Holliman, which describes that the differential movement method "determines the movement of the target image between consecutive fields *and adds this to the position* found by local template matching. . ." (Emphasis Added). Thus, the so-called differential method actually results in a positional movement value, not a composite image.

Since Holliman and Hipp do not disclose or suggest the above limitations, any purported combination of these references cannot result in the subject matter of claims 40, 50, and 53. For at least the foregoing reasons, Appellant respectfully submits that the prima facie case of the § 103 rejection for claims 40, 50, and 53 based on Holliman and Hipp has not been established.

III. Claim Rejections under 35 U.S.C. § 103 based on Hipp and Abe

Claims 64-66 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Holliman in view of Hipp, and further in view of U.S. Patent No. 5,134,472 (Abe).

Claim 64 recites that the act of determining whether the object has moved *does not require a determination of an amount of movement by the object* (Emphasis Added). Claim 65 recites that the means for determining whether the object has moved is configured to determine whether the object has moved *without determining an amount of movement by the object* (Emphasis Added). Claim 66 recites that the act of determining whether the object has moved *does not require a determination of an amount of movement by the object* (Emphasis Added).

Appellant agrees with the Examiner that Holliman and Hipp do not disclose or suggest the above limitations. According to the Office Action, column 1, lines 43-55 of Abe allegedly disclose the above limitations. Appellant respectfully disagrees. The cited passage of Abe actually discloses:

> Accordingly, it is an object of the present invention to provide an apparatus that correctly detects a moving image within an image area corresponding to a moving object within the image area. It is a further object of the present invention to avoid erroneous indications of moving objects within an image area.
> It is a further object of the present invention to provide an apparatus that detects the entire image of a moving object.
> In accordance with the present invention, the foregoing objects, among others, are achieved by providing an apparatus for detecting a moving image . . ..

Thus, the above cited passage actually discloses determining a moving image that corresponds with a moving object, and does not disclose or suggest the act of determining whether an object has moved or not. In particular, the determining of the moving image, according to the above cited passage of Abe, is based on the assumption that the object has moved. Thus, the method of Abe clearly does not involve the act of determining whether an object has moved.

Furthermore, the above cited passage does not disclose or suggest that an amount of movement of the object is <u>not</u> determined. Note that a mere silence of a limitation by a reference cannot anticipate a negative of such limitation (in other words, just because the cited passage of Abe does not mention object movement, it does not mean that the method of Abe does not involve determining an object movement). This is especially the case with Abe because the cited passage is a summary of the method, which does not provide all the details. Rather, according to the detail description, Abe in fact does disclose using position data in its algorithm (See for example, claim 7 stating "generating at least two position signals corresponding to at least two positions of the moving object."). Also, column 8, line 31 of Abe discloses YE_f-YE_n, which corresponds to an amount of movement of object from coordinate YE_n to coordinate YE_f (see figure 8B).

Since Holliman, Hipp, and Abe do not disclose or suggest the above limitations, any purported combination of these references cannot result in the subject matter of claims 64-66. For at least the foregoing reasons, Appellant submits that the prima facie case of the § 103 rejection for claims 64-66 based on Holliman, Hipp, and Abe has not been established.

IV. Other Claim Rejections under 35 U.S.C. § 103

Claims 25 and 26 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fenster in view of U.S. Patent No. 6,311,084 (Cormack). For at least the same reasons that independent claim 1 is allowable, dependent claims 25 and 26 should also be allowable.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. Patent No. 6,563,945 (Holm). For at least the same reasons that independent claim 1 is allowable, dependent claim 5 should also be allowable.

Claim 10 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. 2004/0077952 (Rafter). For at least the same reasons that independent claim 1 is allowable, dependent claim 10 should also be allowable.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. Patent No. 7,062,078 (Weese). For at least the same reasons that independent claim 1 is allowable, dependent claim 11 should also be allowable.

Claims 15-17, 19, 28-30, and 37-39 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. 2003/0026758 (Baker). For at least the same reasons that independent claims 1, 22, and 31 are allowable, their respective dependent claims 15-17, 19, 28-30, and 37-39 should also be allowable.

Claims 58-60 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hipp in view of U.S. Patent No. 6,526,156 (Black). For at least the same reasons that independent claims 1, 22, and 31 are allowable, their respective dependent claims 58-60 should also be allowable.

Claims 41, 42, 44, 45, 51, 52, 54, and 55 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatantable over Holliman in view of Hipp, and further in view of U.S. Patent No. 5,109,435 (Lo). For at least the same reasons that independent claims 40, 50, and 53 are allowable, their respective dependent claims 41, 42, 44, 45, 51, 52, 54, and 55 should also be allowable.

The Commissioner is authorized to charge any fees due in connection with the filing of this document to Vista IP Law Group's Deposit Account No. **50-1105,** referencing billing number **VM 03-009-US**.

Respectfully submitted,

DATE: April 25, 2011

By: /Gerald Chan/
Gerald Chan
Registration No. 51,541

VISTA IP LAW GROUP, LLP
1885 Lundy Ave., Suite 108
San Jose, California 95131
Telephone: (408) 321-8663 (Ext. 203)
Facsimile: (408) 877-1662

APPENDIX A: Pending Claims

Listing of Claims 1-66.

1. (Previously Presented) A method of determining a position of a target region in a medical procedure, comprising:

acquiring an input image of a target region;

enhancing a feature of the input image based at least in part on a motion of a moving object, wherein the act of enhancing is performed such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving object moves relative to the stationary object, and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction;

registering the input image with a template; and

determining a position of the target region in the input image based on the registering;

wherein one of the acts of acquiring, enhancing, registering, and determining in the method is performed at least partially using a processor.

2. (Original) The method of claim 1, wherein the enhancing comprises determining a composite image of previously acquired input images.

3. (Previously Presented) The method of claim 2, wherein the determining the composite image comprises performing the image averaging on the previously acquired input images.

4. (Previously Presented) The method of claim 2, wherein the image subtraction comprises subtracting the composite image from the input image.

5. (Original) The method of claim 3, wherein the image averaging is performed using a boxcar averaging technique.

6. (Original) The method of claim 3, wherein the image averaging is performed based on a weighted average.

7. (Original) The method of claim 1, further comprising selecting the template from a plurality of templates.

8. (Original) The method of claim 7, wherein the selecting comprises choosing a template from the plurality of templates that best matches at least a portion of the input image.

9. (Original) The method of claim 7, wherein the selecting comprises:
comparing the input image with at least a subset of the templates; and
selecting the template that best matches at least a portion of the input image.

10. (Original) The method of claim 7, wherein the selecting comprises comparing the input image with the template that is generated at approximately a same time-point or a same phase of a physiological cycle as the input image.

11. (Original) The method of claim 7, wherein the selecting comprises:
determining a previously registered template; and
comparing the input image with the template next in line to the previously registered template.

12. (Original) The method of claim 1, wherein the determining a position of the target region comprises determining a position of the image in the input image that best matches the template.

13. (Original) The method of claim 1, wherein the input image comprises a fluoroscopic image.

14. (Original) The method of claim 1, further comprising performing a medical procedure based on the determined position of the target region.

15. (Previously Presented) The method of claim 14, wherein the medical procedure comprises directing a radiation beam to the target region.

16. (Original) The method of claim 15, wherein the performing the medical procedure comprises changing a direction of a radiation beam in response to the determined position.

17. (Original) The method of claim 15, wherein the performing the medical procedure comprises gating a delivery of the radiation beam in response to the determined position.

18. (Original) The method of claim 1, wherein the target region comprises at least a part of an animal body.

19. (Original) The method of claim 18, wherein the at least a part of an animal body comprises a lung tissue or a heart tissue.

20. (Original) The method of claim 18, wherein the at least a part of an animal body comprises a bone.

21. (Original) The method of claim 1, wherein the target region comprises at least a part of a non-animal object.

22. (Previously Presented) A system for determining a position of a target region in a medical procedure, comprising:

means for acquiring an input image of a target region;

means for enhancing a feature in the input image based at least in part on a motion of a moving object, wherein the means for enhancing performs the act of enhancing such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving object moves relative to the relatively stationary object, and wherein the means for enhancing is configured to accomplish the act of enhancing at least in part by performing image averaging and image subtraction;

means for registering the input image with a template; and

means for determining a position of the target region in the input image based on the registering.

23. (Original) The system of claim 22, wherein the means for enhancing comprises means for determining a composite image of previously acquired input images.

24. (Original) The system of claim 22, further comprising means for selecting the template from a plurality of templates.

25. (Original) The system of claim 24, wherein the means for selecting comprises means for choosing a template from the plurality of templates that best matches an image in the input image.

26. (Original) The system of claim 22, wherein the means for acquiring an input image comprises means for generating a fluoroscopic image.

27. (Original) The system of claim 22, further comprising means for performing a medical procedure based on the determined position of the target region.

28. (Previously Presented) The system of claim 27, wherein the means for performing the medical procedure comprises means for directing a radiation beam to target region.

29. (Original) The system of claim 28, wherein the means for performing the medical procedure comprises means for changing a direction of a radiation beam in response to the determined position.

30. (Original) The system of claim 28, wherein the means for performing the medical procedure comprises means for gating a delivery of the radiation beam in response to the determined position.

31. (Previously Presented) A computer readable medium having a set of stored instructions, the execution of which causes a process to be performed, the computer readable medium being tangible and non-transitory, the process comprising:

acquiring an input image of a target region;

enhancing a moving feature in the input image based at least in part on a motion of a moving object, wherein the act of enhancing is performed such that an image of the moving object is enhanced relative to an image of a relatively stationary object if the moving object moves relative to

the relatively stationary object, and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction;

registering the input image with a template; and

determining a position of the target region in the input image based on the registering.

32. (Original) The computer readable medium of claim 31, wherein the enhancing comprises determining a composite image of previously acquired input images.

33. (Original) The computer readable medium of claim 31, wherein the process further comprising selecting the template from a plurality of templates.

34. (Original) The computer readable medium of claim 33, wherein the selecting comprises choosing a template from the plurality of templates that best matches an image in the input image.

35. (Previously Presented) The computer readable medium of claim 31, wherein the input image comprises a fluoroscopic image.

36. (Previously Presented) The computer readable medium of claim 31, wherein the process further comprising performing a medical procedure based on the determined position of the target region.

37. (Previously Presented) The computer readable medium of claim 36, wherein the medical procedure comprises directing a radiation beam to the target region.

38. (Original) The computer readable medium of claim 37, wherein the performing the medical procedure comprises changing a direction of a radiation beam in response to the determined position.

39. (Original) The computer readable medium of claim 37, wherein the performing the medical procedure comprises gating a delivery of the radiation beam in response to the determined position.

40. (Previously Presented) A method of monitoring a position of an object, comprising:

providing a reference image of the object;

acquiring a first image of the object;

determining a first composite image based on the reference image and the first image by performing a subtraction function; and

determining whether the object has moved based at least on the first composite image, wherein the act of determining whether the object has moved comprises using a contrast associated with the first composite image.

41. (Previously Presented) The method of claim 40, further comprising determining a first value associated with a contrast of the first composite image.

42. (Previously Presented) The method of claim 41, wherein the determining whether the object has moved is performed based on the first value.

43. (Original) The method of claim 40, further comprising:

acquiring a second image of the object;

determining a composite image based on the second image and the reference image; and

determining whether the object has moved based at least on the second composite image.

44. (Original) The method of claim 43, further comprising determining a second value associated with a contrast of the second composite image.

45. (Original) The method of claim 44, wherein the determining whether the object has moved is performed based on the second value.

46. (Original) The method of claim 40, wherein the object comprises at least a portion of an animal body.

47. (Original) The method of claim 46, wherein the at least a portion of an animal body comprises a bone.

48. (Original) The method of claim 40, wherein the first image comprises a fluoroscopic image.

49. (Original) The method of claim 40, further comprising enhancing a moving object in the first image.

50. (Previously Presented) A system for monitoring a position of an object, comprising:

means for providing a reference image of the object;

means for acquiring a first image of the object;

means for determining a first composite image based on the reference image and the first image by performing a subtraction function; and

means for determining whether the object has moved based at least on the first composite image, wherein the means for determining whether the object has moved determines whether the object has moved using a contrast associated with the first composite image.

51. (Original) The system of claim 50, further comprising means for determining a first value associated with a contrast of the first composite image.

52. (Original) The system of claim 50, further comprising means for enhancing a moving object in the first image.

53. (Previously Presented) A computer readable medium having a set of stored instructions, the execution of which causes a process to be determined, the computer readable medium being tangible and non-transitory, the process comprising:

providing a reference image of the object;

acquiring a first image of the object;

determining a first composite image based on the reference image and the first image by performing a subtraction function; and

determining whether the object has moved based at least on the first composite image, wherein the act of determining whether the object has moved comprises using a contrast associated with the first composite image.

54. (Original) The computer readable medium of claim 53, wherein the process further comprising determining a first value associated with a contrast of the first difference image.

55. (Original) The computer readable medium of claim 53, wherein the determining whether the object has moved is performed based on the first value.

56. (Original) The computer readable medium of claim 53, wherein the process further comprising enhancing a moving object in the first image.

57. (Previously Presented) The method of claim 40, wherein the reference image and the first image are obtained from a same imaging direction relative to the object.

58. (Previously Presented) The method of claim 1, wherein the act of enhancing is performed without specifically identifying the moving object.

59. (Previously Presented) The system of claim 22, wherein the means for enhancing does not specifically identify the moving object.

60. (Previously Presented) The computer readable medium of claim 31, wherein the act of enhancing is performed without specifically identifying the moving object.

61. (Previously Presented) The method of claim 1, wherein the image of the moving object is enhanced by reducing an appearance of the stationary object.

62. (Pr`eviously Presented) The method of claim 1, wherein when the moving object moves relative to the stationary object, the act of enhancing causes the moving object to appear relatively more noticeable than the stationary object.

63. (Previously Presented) A method of determining a position of a target region in a medical procedure, comprising:

acquiring an input image of a target region;

enhancing a feature of the input image, wherein the act of enhancing is performed such that an object appears more noticeable than a stationary object if the object moves relative to the stationary object, and wherein the act of enhancing is accomplished at least in part by performing image averaging and image subtraction;

registering the input image with a template; and

determining a position of the target region in the input image based on the registering.

64. (Previously Presented) The method of claim 40, wherein the act of determining whether the object has moved does not require a determination of an amount of movement by the object.

65. (Previously Presented) The system of claim 50, wherein the means for determining whether the object has moved is configured to determine whether the object has moved without determining an amount of movement by the object.

66. (Previously Presented) The computer readable medium of claim 53, wherein the act of determining whether the object has moved does not require a determination of an amount of movement by the object.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None